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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/750,059	12/30/2003	Hiroshi Miyazaki	TI-36833	9129

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EXAMINER	
LE, THAO X	

ART UNIT	PAPER NUMBER
2814	

DATE MAILED: 07/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

Office Action Summary	Application No.	Applicant(s)	
	10/750,059	MIYAZAKI, HIROSHI	
	Examiner	Art Unit	
	Thao X. Le	2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 December 2003*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6,8-11,13-16 and 18-20* is/are pending in the application.

4a) Of the above claim(s) *22-27* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,8-11,13-16 and 18-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. The Examiner indicated allowability of claims 10 and 20 if their limitations were incorporated into the independent claims 1 and 13, respectively. The allowability is withdrawn in view of the newly discovered reference(s) to Lee (6806570). Rejections based on the newly cited reference follow.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1, 8-10, 13, and 18 are rejected under 35 U.S.C. 102(e) as being anticipated by US 6806570 to Lee et al.

Regarding claim 1, Lee discloses in fig. 7 an interconnect structure comprising: a substrate 20, column 3 line 9, a conductive contact pad 34/36, column 3 line 27, disposed over a portion of the substrate surface 20, having an inner portion (where layer 32 is located) and an outer portion surrounding the inner portion, the inner portion of the contact pad 34 having a compliant layer 32, column 3 lines 15-6, under the contact pad 34 and the outer portion of the contact pad 34/36 not including a compliant

layer 32, the portion of the contact pad 34/36 over the compliant layer 32 having a thickness thinner than the thickness of the outer portion, fig. 7, of the contact pad 34/36, and an insulative mask 38, fig. 7, disposed over the contact pad 34/36, the insulative mask including an opening that is aligned over and that exposes the inner portion, the inner portion of the contact pad 34/36 having sufficient flexibility to distribute mechanical stress applied to the contact pad, column 3 line 15-17.

Regarding claim 8-9, 18 Lee discloses the interconnect structure wherein the inner portion of the contact pad 34 being substantially more flexible than the outer portion 34/46 (thinner 34 vs. thickness 34/36), and wherein the opening a substantially planar contact surface, fig. 7.

Regarding claim 10, Lee discloses the interconnect structure of claim 1 further including a solder contact 30, column 3 line 30, attached to the contact surface, the solder contact 30 including a contact portion defined by the opening of the insulative mask 38, fig. 7.

Regarding claim 13, Lee discloses an interconnect structure comprising: a substrate 20, a conductive contact pad 34 disposed over a portion of the substrate surface, having an inner portion (where 32 is located) and an outer portion 34/36 surrounding the inner portion; the inner portion of the contact pad having a compliant layer 32, fig. 7, under the contact pad and the outer portion 34/36 of the contact pad not including a compliant layer; the portion 34 of the contact pad over the compliant layer 32 having a thickness thinner than the thickness of the outer portion 34/36 of the contact pad; and an insulative mask 38 disposed over the contact pad 34, the insulative mask

38 including an opening that is aligned over and that exposes a contact surface of the contact pad 34, the contact surface being defined by the inner portion and part of the outer portion, fig. 7.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 2--6, 14-16, 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6806570 to lee Lutz in view of US 6211572 to Fjelstad et al.

Regarding claims 2, 3, 14, Lee discloses the interconnect structure wherein the compliant layer 32 being formed from a compliant material comprises air, column 3 line 20, wherein the contact pad 34/36 comprising a conductive metal.

But Lee does not discloses the compliant material 32 that has an elastic modulus lower than the elastic modulus of the material used to form the contact pad 34, and wherein the compliant layer 32 comprising at least one of a metal, a non-metal, a ceramic, and a composite.

However, Fjelstad discloses a interconnect structure wherein the compliant layer 140, column 6 line 26, being formed from a compliant material that has an elastic modulus lower than the elastic modulus of the material used to form the contact pad 150, column 6 line 43, and wherein the compliant layer

140 comprising at least one of a metal, a non-metal, a ceramic, and a composite, column 6 lines 25-35. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to use the compliant layer 140 teaching of Fjelstad to replace the air gap 32 of Lee, because it would have provided the provided stress relief during handing or affixing the assembly as taught by Fjelstad, see abstract.

Regarding claims 4, 15, Lee discloses the interconnect structure of claim 1, the contact pad 34/36 comprising copper, column 3 line 26, and the compliant layer 32 comprising air.

But Lee does not discloses the compliant material 32 having an elastic modulus lower than the elastic modulus of copper.

However, Fjelstad discloses a interconnect structure wherein the compliant layer 140, column 6 line 26, being formed from a compliant material that has an elastic modulus lower than the elastic modulus copper (polymer would have the elastic modulus lower than the elastic modulus of copper). At the time the invention was made; it would have been obvious to one of ordinary skill in the art to use the compliant layer 140 teaching of Fjelstad to replace the air gap 32 of Lee, because it would have provided the provided stress relief during handing or affixing the assembly as taught by Fjelstad, see abstract.

Regarding claims 5-6, 16, Lee discloses the interconnect structure wherein the compliant layer 32 being more flexible than the contact pad 34/36.

But Lee does not discloses the interconnect structure wherein the compliant layer 32 being formed from a compliant material that has an elastic modulus higher than the elastic modulus of the material used to form the conductive layer and comprising at least one of pores (foam), apertures, and voids to provide the compliant layer with a flexibility greater than the conductive layer.

However, Fjelstad discloses the interconnect structure in fig. 1F wherein the compliant layer 140 being formed from a compliant material that has an elastic modulus higher than the elastic modulus of the material used to form the conductive layer, column 6 lines 39-40, and comprising at least one of pores (foam), apertures, and voids to provide the compliant layer with a flexibility greater than the conductive layer, column 6 line 34-45. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to use the compliant layer teaching of Fjelstad with Lee's device, because using such material configuration would have resulted in a flexible material capable of bucking or wrinkling as taught by Fjelstad, column 6 line 35-45.

But Lutz does not discloses the at least one conductive layer 240 of the outer portion having a thickness substantially greater than the thickness of the conductive layer of the inner portion, and the conductive layer of the inner portion being substantially more flexible than the at least one conductive layer of the outer portion.

Regarding claims 11, 19, Lee does not discloses the interconnect structure wherein the contact surface including at least one protrusion that extends within the opening from the contact surface, the protrusion being defined by the compliant layer.

However, Fjelstad discloses the interconnection structure wherein the contact surface including at least one protrusion that extends within the opening from the contact surface, the protrusion being defined by the compliant layer 140, fig. 1f. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to use the compliant layer 140 teaching of Fjelstad to replace the air gap 32 of Lee, because it would have provided the provided stress relief during handing or affixing the assembly as taught by Fjelstad, see abstract.

Regarding claim 18 Lee discloses the interconnect structure wherein the inner portion of the contact pad 34 being substantially more flexible than the outer portion 34/46 (thinner 34 vs. thickness 34/36), fig. 7.

Regarding claim 20, Lee discloses the interconnect structure of claim 1 further including a solder contact 30, column 3 line 30, attached to the contact surface, the solder contact 30 including a contact portion defined by the opening of the insulative mask 38, fig. 7.

Response to Arguments

6. Applicant's arguments filed on May 19, 2005 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thao X. Le whose telephone number is (571) 272-1708. The examiner can normally be reached on M-F from 8:00 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M. Fahmy can be reached on (571) 272 -1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Thao X. Le
Patent Examiner
27 June 2005

PRIMARY EXAMINER